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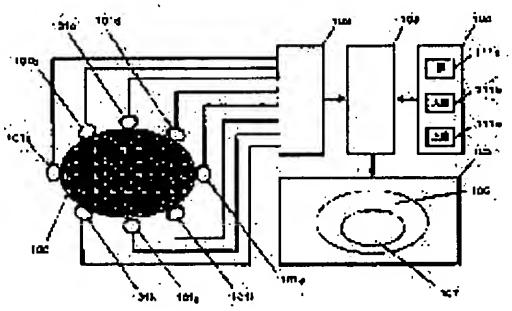
(54) BODY FAT MEASUREMENT DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To compute a body fat distribution in an electrode installing part cross section by measuring impedances between a plurality of electrodes.

SOLUTION: In this device, impedances between a plurality of electrodes 101 (101a-101h) installed onto a body surface are measured by means of a measuring means 102, and an impedance array for an electrode mounting part cross section 100 is generated, and then, a computing means 103 finds a product of the impedance array and a coefficient array complying with the mounting part information from an input means 104 so as to clarify a body fat distribution of the objective cross section. Using an image via a display means 105, the body fat distribution is informed visually to a user.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the technique which computes body fat distribution of the living body part cross section equipped with an electrode in the equipment which measures a living body's body fat.
[0002]
[Description of the Prior Art] Measurement of body fat has the advantage whose high control of precision is attained rather than it makes only weight into an index when managing obesity, and is spreading widely also in the health care in a home. Although the large-scale equipment of underwater hiding the whole body and measuring gravity conventionally was required, the conventional approach and the mutually related simple high measurement approach are proposed in recent years. Although there are some these which use near-infrared light and a supersonic wave, the approach which used the impedance recently is in use.
[0003] There are some which compute the body fat percentage of the upper half of the body as a technique of the body fat measurement using a living body impedance by measuring the impedance between both hands, for example like JP,7-51242,A. Drawing 5 is the block diagram of the conventional technique. Grip 2a and grip 2b are prepared in the both ends of a body 1 possible [grasp]. The 1st electrode pair which becomes a grip 2 from an electrode 3 and an electrode 4, and the 2nd electrode pair which consists of an electrode 5 and an electrode 6 are arranged. The 1st electrode pair impresses a RF signal and the 2nd electrode pair is for measuring body resistance potential. After a user inputs body specification information, such as height and weight, if grip 2a and grip 2b are grasped, a living body impedance will be measured and data, such as a fat in the living body, a fat-free mass, a body fat percentage, a moisture content, and a basal metabolic rate, will be extracted.
[0004]
[Problem(s) to be Solved by the Invention] It is thought that the body fat measurement using an impedance will spread increasingly in respect of the handiness from now on. However, what kind of movement should be carried out had the technical problem were unclear, only by getting to know the body fat percentage of the whole body or a half the body. Although what is necessary is just to burn a fat by exercise of the whole body, of course, for a sticking [how / the fat]-partially user, they are contents to know very much. However, in local skinfold thickness, it will seldom be accompanied by feelings. Although it will become [although there is no problem as a form,] information useful also for a user if an example is taken in the increment in the case in which the fat is attached to internal organs in fact, and fat distribution of a certain living body cross section is known, what has such a function is not accepted in the conventional technique.
[0005] And when measuring partial body fat distribution, the technical problem that the information about the measurement part had to be given occurred.
[0006] Moreover, although two or more electrodes needed to be equipped in order to know body fat distribution, there was a technical problem that complicatedness followed in these attachment and

detachment.
[0007] Furthermore, it is the present condition which indexes, such as a body fat percentage, cannot say easily that an understanding of the numerical semantics has fully permeated all users unlike weight etc. Therefore, in order to make body fat distribution understand intuitively, the technical problem that the body fat part by the image had to be displayed occurred.
[0008]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, this invention equips a body surface with two or more electrodes, is with an image through a display means, and reports distribution of body fat to a user visually while measuring an inter-electrode impedance, generating the impedance matrix of an electrode wearing part cross section and an operation means' clarifying body fat distribution of an object cross section in quest of a product with the coefficient matrix according to a wearing part with a measurement means.
[0009]
[Embodiment of the Invention] This invention is considered as the configuration equipped with an operation means to compute the body fat distribution in the cross section of the living body part which equipped with said electrode from the impedance obtained from a measurement means to measure two or more impedances using two or more electrodes with which the body surface was equipped, and said two or more electrodes, and said measurement means.
[0010] And a measurement means measures the inter-electrode impedance of arbitration to sequential or coincidence using two or more electrodes, the matrix of the impedance of the cross section of the living body part where it was equipped with the electrode is generated, and an operation computes distribution of the body fat in a cross section from this matrix.
[0011] Moreover, a measurement means to measure two or more impedances using two or more electrodes which equipped the body surface with this invention, and said two or more electrodes, An input means to input the information about the living body part equipped with said two or more electrodes, It has an operation means to compute the body fat distribution in the cross section of said living body part from the impedance obtained from said measurement means, and has considered as the configuration which uses the information inputted into said input means in said operation means for amendment of calculation of said body fat distribution.
[0012] And amendment is added to calculation of the body fat distribution in a **** operation means to take to the information inputted into the input means.
[0013] Moreover, information inputted into an input means is characterized by being the perimeter of the living body part equipped with a sensor.
[0014] Moreover, information inputted into an input means is characterized by being the name of the living body part equipped with a sensor.
[0015] Moreover, two or more electrodes are considered as the configuration arranged by the belt with which a living body can be equipped. And when a user equips a measurement part with a belt, in contact with a body surface, the impedance measurement of the electrode arranged by the belt is attained.
[0016] Moreover, when a living body is equipped with a belt, it has a perimeter measurement means to measure the perimeter of a wearing part, and it is characterized by an operation means using the perimeter of said wearing part which said perimeter measurement means measured for amendment of body fat distribution calculation.
[0017] And it is utilized for amendment of an operation, even if it will measure the perimeter automatically and a user will not input, if it equips with a belt.
[0018] Moreover, it has considered as the configuration equipped with a display means to display a body fat part and a non-body fat part for body fat distribution identifiable.
[0019] And the result of an operation in an operation means is displayed on a user with an image, and grasp of the condition about body fat distribution is made easy.
[0020]
[Example] Hereafter, the example of this invention is explained using a drawing.
[0021] (Example 1) Drawing 1 is the block diagram of the body fat measuring device of the example 1

of this invention. The perimeter of the living body cross section 100 is equipped with the electrodes 101a, 101b, 101c, 101d, 101e, 101f, 101g, and 101h for impedance measurement. These are connected to the measurement means 102. Furthermore, the measurement means 102 is constituted so that impedance information may be outputted to the operation means 103. It is constituted by the operation means 103 so that the information about the living body part which equipped with the electrode also from the input means 104 may be sent. The output of the operation means 103 is outputted from the display means 105. A thing usable [a common living body electrode] and disposable may be used for an electrode 101. The measurement means 102 and the operation means 103 are realizable in the microcomputer circuit which added the switching circuit and impedance measurement circuit for choosing an electrode 101. What is necessary is just to use a liquid crystal display for the display means 104. In addition, the living body cross section 100 assumes an abdomen, a femoral region, or the overarm section of the body etc.

[0022] In the above-mentioned configuration, the measurement means 102 measures two inter-electrode impedances sequentially from the inside of an electrode 101, and generates the matrix of the impedance in the living body cross section 100. Since it is common that four electrode methods are used for measurement of a living body impedance, it is not necessary to necessarily choose only two electrodes at the time of measurement. Also in the case of four electrode methods, each of an electrode 101 can make the object for electrical-potential-difference impression, and the object for impedance measurement serve a double purpose.

[0023] Drawing 2 uses the living body cross section 100 as an abdomen, and is the explanatory view of other inter-electrode impedances on the basis of electrode 101a. 106 is a body fat part and 107 is a non-fat component. 108 is a spine. Therefore, it turns out that an abdomen is equipped with Electrodes 101b, 101c, and 101d, and Electrodes 101a and 101e have equipped both sides with Electrodes 101f, 101g, and 101h back further. When based on electrode 101a, it is the impedances 109a, 109b, 109c, 109d, 109e, 109f, and 109g which are measurable among other electrodes.

[0024] The magnitude of each impedance is shown in drawing 3 . The X-axis and a Y-axis show the plane coordinates of the living body cross section 100. 110 shows the stowed position of electrode 109a. As for an impedance, inter-electrode [approaching] is smaller as shown in drawing 3 . Moreover, the inclination for the abdomen side of an impedance to increase more than a regions-of-back side is accepted. An impedance has amount of body fat and high correlation, and it is known that the partial impedance of the part containing many body fat will become high. In drawing 3 , body fat is in agreement with the fact of being distributed more mostly [an abdomen side] than a regions-of-back side.

[0025] Although the reference electrode is set to electrode 109a in drawing 2 , the measurement means 102 performs impedance measurement about the combination between all two in an electrode 101 by using other electrodes as the reference electrode one by one.

[0026] Body fat distribution of an electrode wearing part is searched for by matrix count. That is, it asks two-dimensional by hanging the coefficient matrix which approximates body fat thickness to the matrix of the impedance generated by the measurement which the measurement means 102 performed in the operation means 103. What changes with wearing parts of an electrode may be used for the coefficient matrix to be used. It can input which part of the body is equipped with the electrode from the input means 104. The carbon buttons 111a, 111b, and 111c for specifying a part are prepared for the input means 104. Of course, the number of carbon buttons 111 does not restrain this invention. Moreover, since the impedance between electrodes 101 changes also with perimeters of a wearing part, it can also apply amendment by inputting the perimeter.

[0027] The body fat distribution searched for is displayed on a screen as a graphic form by the display means 105. By classifying the body fat part 106 and the non-body fat part 107 by color in the cross section of a wearing part, a user can check distribution of body fat at a glance. Of course, it is also possible to compute the body fat percentage of a cross section from the surface ratio of the body fat part 106 and the non-body fat part 107, and it may display this as auxiliary information.

[0028] It turns out how much body fat takes the post of which part by getting to know body fat

distribution, and since body fat is reduced, it can use for creation of an effective movement menu.
[0029] (Example 2) Drawing 4 is the sketch showing the configuration of the belt of the body fat measuring device of the example 2 of this invention. Electrodes 101a, 101b, 101c, 101d, 101e, 101f, 101g, and 101h are arranged by the belt 112. A connector 113 is for a cable (not shown) to tie each and the measurement means 102 of an electrode 101. In case a piece of Velcro 114 equips the body with a belt 112, it is for fixing a belt 112 by binding tight by moderate strength.
[0030] Moreover, the perimeter measurement means 115 is arranged along with the belt 112, has become the scale which can be read electrically, and it is constituted so that a living body's perimeter can be measured in a fixed position 116.
[0031] In the above-mentioned configuration, a user equips with a belt 112 the part which wants to know body fat distribution. By fixing on a piece of Velcro 114, an electrode 101 contacts a body surface. Although the numbers of an electrode 101 which contact with the perimeter of a wearing part differ, amendment can be applied, when a belt 112 is fixed, and reading the perimeter in a fixed position 116 and performing matrix count.
[0032]
[Effect of the Invention] According to this invention, there is the following effectiveness as mentioned above.
[0033] By asking for the impedance matrix of the electrode wearing part cross section generated using two or more electrodes, body fat distribution of a living body cross section is computable two-dimensional.
[0034] By inputting the information about an electrode wearing part from an input means, data can be amended in the case of body fat distribution calculation.
[0035] By making input into the perimeter of an electrode wearing part, the amendment according to change of an inter-electrode consistency can be applied.
[0036] By making input into the name of an electrode wearing part, the coefficient matrix used based on the anatomical character of a wearing part in the case of body fat distribution calculation can be chosen.
[0037] By arranging two or more electrodes in a belt, attachment and detachment of an electrode can be made easy. The perimeter of a living body part is measured only by equipping with a belt with a perimeter measurement means, and even if a user does not input, amendment for an exact operation can be performed.
[0038] It can be made easy that a user understands body fat distribution intuitively by displaying a body fat part and a non-body fat part identifiable using an image.

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CLAIMS

[Claim(s)]
[Claim 1] The body fat measuring device equipped with an operation means to compute the body fat distribution in the cross section of the living body part which equipped with said electrode from the impedance obtained from a measurement means to measure two or more impedances using two or more electrodes with which the body surface was equipped, and said two or more electrodes, and said measurement means.
[Claim 2] A measurement means to measure two or more impedances using two or more electrodes with which the body surface was equipped, and said two or more electrodes, An input means to input the information about the living body part equipped with said two or more electrodes, The body fat measuring device characterized by using the information which was equipped with an operation means to compute the body fat distribution in the cross section of said living body part, and was inputted into said input means in said operation means from the impedance obtained from said measurement means for amendment of calculation of said body fat distribution.
[Claim 3] The information inputted into an input means is a body fat measuring device according to claim 2 which is the perimeter of the living body part equipped with a sensor.
[Claim 4] The information inputted into an input means is a body fat measuring device according to claim 2 which is the name of the living body part equipped with a sensor.
[Claim 5] Two or more electrodes are claim 1 arranged by the belt with which a living body can be equipped thru/or the body fat measuring device of four given in any 1 term.
[Claim 6] It is the body fat measuring device according to claim 5 which has a perimeter measurement means to measure the perimeter of a wearing part when a living body is equipped with a belt, and is characterized by an operation means using the perimeter of said wearing part which said perimeter measurement means measured for amendment of body fat distribution calculation.
[Claim 7] Claim 1 equipped with a display means to display a body fat part and a non-body fat part for body fat distribution identifiable thru/or the body fat measuring device of six given in any 1 term.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block diagram of the body fat measuring device of the example 1 of this invention
[Drawing 2] The explanatory view of the impedance measurement in a living body cross section
[Drawing 3] The graph which shows an inter-electrode impedance
[Drawing 4] The sketch of the belt in the body fat measuring device of the example 2 of this invention
[Drawing 5] The block diagram of the conventional technique
[Description of Notations]
101a, 101b, 101c, 101d, 101e, 101f, 101g, 101h Electrode
102 Measurement Means
103 Operation Means
104 Input Means
105 Display Means
112 Belt
115 Perimeter Measurement Means

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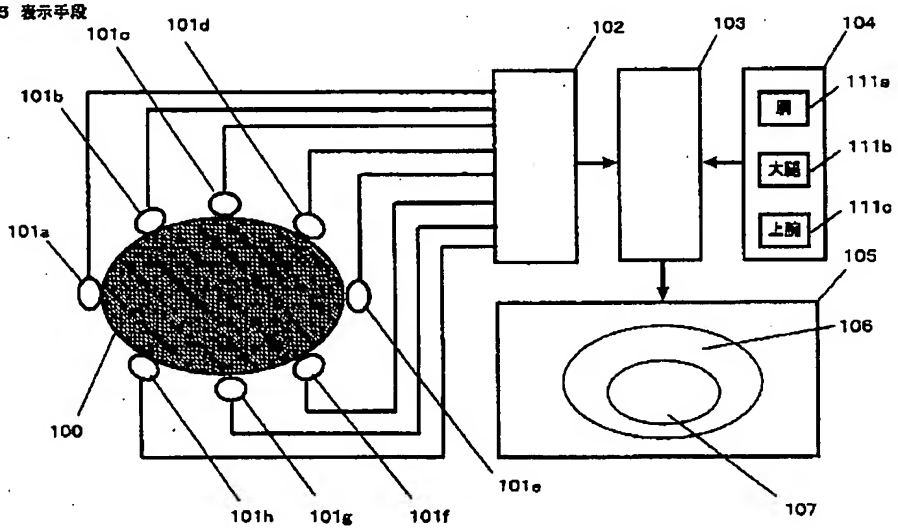
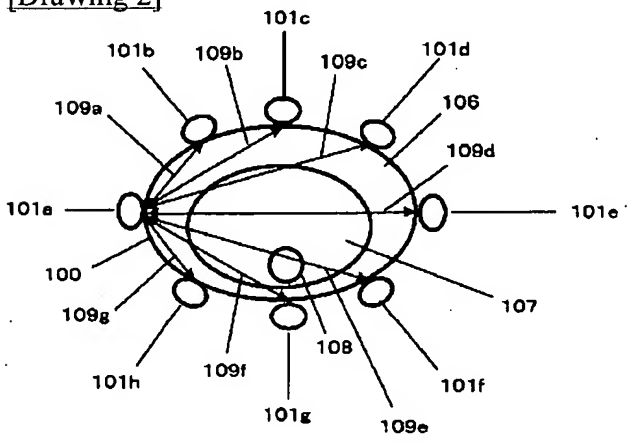
DRAWINGS

[Drawing 1]

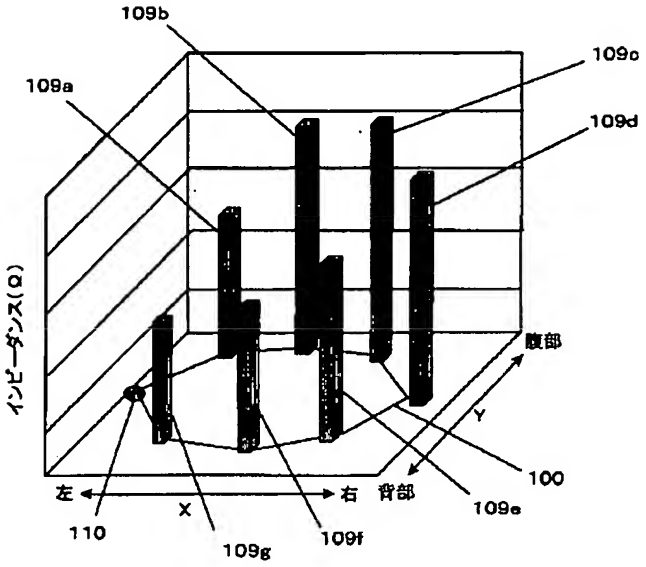
101a, 101b, 101c, 101d, 101e, 101f, 101g, 101h 電極
102 計測手段
103 演算手段
104 入力手段
105 表示手段



[Drawing 2]

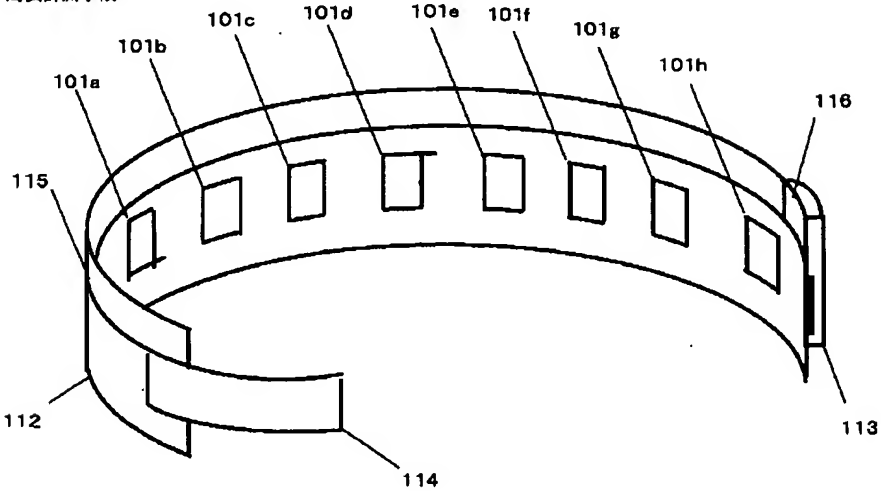


[Drawing 3]

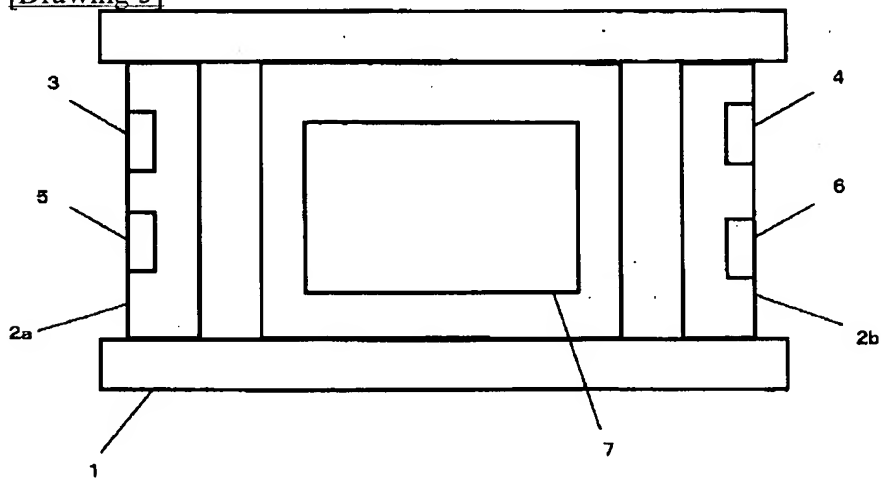


[Drawing 4]

112 ベルト
115 周長計測手段



[Drawing 5]



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